2A92-21

TANNER CRAB SURVIVAL IN CLOSED POTS

by
Al Kimker
Regional Shellfish Biologist

Regional Information Report[1] No. 2A92-21

Alaska Department of Fish and Game
Division of Commercial Fisheries Central Region
333 Raspberry Road
Anchorage, AK 99518-1599

October 1992

Carl L. Rosier - Commissioner
Robert C. Clasby - Acting Director of Commercial Fisheries

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

A.D.A. PUBLICATIONS STATEMENT

The Alaska Department of Fish and Game conducts all programs and activities free from discrimination on the basis of sex, color, race, religion, national origin, age, marital status, pregnancy, parenthood or disability. For information on alternative formats available for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4129, (TDD) 1-800-478-3648 or (fax) 907-586-6596. Any person who believes s/he has been discriminated against should write to: ADF&G P.O. Box 25526, Juneau, AK 99802-5526; or O.E.O., U.S. Department of the Interior, Washington, DC 20240.

TABLE OF CONTENTS

LIST OF TABLES

Table — Page

LIST OF FIGURES

Figure — Page

INTRODUCTION

Mortality of the commercially harvested crab species in Alaska resulting from ghost fishing by pots has always been a concern of both managing agencies and the commercial fishing industry. As a result of this problem the Alaska Board of Fisheries initially adopted a fishing regulation in 1977 which required the use of biodegradable twine in all crab and groundfish pots. The eventual degradation of the twine would allow for escape of the trapped crabs. This issue recently came into focus again as more pots were utilized in an increasingly competitive industry. Subsequent pot losses have been reported in the thousands annually in the Bering Sea alone.

Whether or not untreated cotton twine adheres to the intent of the original escape mechanism legislation has been questioned since inception of the regulation. Dissatisfaction with both the enforceability of the biodegradable regulation and the varying release times of the twine (30 thread cotton) resulted in interest by the Board of Fisheries, Alaska Department of Fish and Game (ADF&G) and industry in employing galvanic timed release (GTR) devices as an escape mechanism in pot gear in lieu of cotton twine.

Commensurate with interest in the GTR was a need to gain specific data on the longevity of the various commercial crab species when trapped. Although both the regulatory agencies and the commercial fishing industry agree that crabs will eventually die when trapped in lost gear (ghost pots), there is substantial disagreement regarding the longevity of the crabs while in these pots and concurrently the long term effect that containment will have on the crabs once they are released. In order to begin answering these questions a commercial fisherman from Cook Inlet volunteered his vessel and gear for a study on the longevity of Tanner crabs (Chionoecetes bairdi) in commercial Tanner pots. This fisherman and other members of the industry hoped that this effort would

serve as a pilot project for a more developed analysis on effects of captivity on all commercial crab species.

METHODS

In order to document the effect on Tanner crabs held in commercial crab gear without either artifical feeding or chance of escape ADF&G employed a voluntary offer to utilize the fishing vessel Anna Lane, owned by Drew Scalzi, while the vessel was commercially fishing for Pacific cod with pot gear. The F/V Anna Lane is a 53 foot steel commercial combination pot and longline vessel home ported in Homer, Alaska. The goal of the experiment was to hold crabs in pots with neiterh chance of escape nor food. The pots would be pulled periodically and the mortalities documented.

One hundred thirty two legal size, 140 mm (5.5 inches) carapace width, male C. bairdi were captured and retained on December 31, 1991. All crabs were legal with a size range of 139 mm to 179 mm and an average of 158 mm. Ninety two percent of the animals were new shell while the remaining eight percent were single skipmolts. None of the crabs selected were missing limbs.

The crabs were kept in a tote with circulating sea water en route to the experimental site. Transit time ranged between 35 to 80 minutes. Air temperature was 0 degrees C. Wind speed was less than 15 knots. The sorting process from capture pot to tote took no longer than 30 to 60 seconds per pot.

The experimental site was in central Cook Inlet west of Kachemak Bay between Point Pogibshi and Anchor Point (Figure 1). The depth strata was between 20 and 40 fathoms. This site was chosen based on its proximity to the Anna Lane's commercial cod pots, a depth where temperature fluctuations should neither be radical nor frequent and a location without the gammarid amphipod which can

kill a crab within 24 hours in a restricted enviroment such as a crab pot.

The crabs were placed in four commercial crab pots that had their tunnels webbed shut. Thirty three crabs were put in each pot. The mesh size on the pots precluded exit by crabs since they were too large to fit through the hung mesh.

The pots were pulled on an irregularly basis due to temperature and wind conditions as well as vessel availability. The frequency of observations (pulling the gear and handling the crabs) was also restricted since continued exposures, although time limited, could have confounded the results. The crabs were counted as quickly as possible and returned to the sea. Exposure time, temperature, wind conditions, bycatch and mortalities were recorded. Qualitative comments such as vigor and limb loss were noted. Specific limb loss was not documented because this would have required additional time on deck. A recent study indicated that exposure of Tanner crabs to cold temperature will have both immeditate and long term effects (Carls and O'Clair, 1989). Dead crabs were not removed from the pots.

RESULTS

The experiment was concluded on April 28, 1992 after a period of 119 days. Termination was a result of commitment of the Anna Lane to other fisheries not in the proximity of the gear. The State Vessel Pandalus was also obligated to other fisheries management projects. The final lift of the gear was conducted from the commercial fishing vessel Historian owned by Ken Rogers.

The gear was pulled eight times to check the crabs. The average time between lifts was 14.9 days with a range of 7 to 28 days. A total of 52 (39 %) of the original 132 crabs died during the 119

days of the experiment. Total deaths for individual pots ranged from 30 to 52 percent. No mortalities were identified until January 14 (14 days) when two crabs from one pot had died (Table 1).

Average exposure time ranged from 2 minutes and 45 seconds on April 10 to 5 minutes to 47 seconds on March 10. Overall mean exposure time was 4 minutes and 8 seconds. Exposure temperature ranged from -4 to +4 degrees C. Wind speed varied between 10 to 25 knots (Table 2).

DISCUSSION

The 39 percent crab mortality was a surprise to both the department staff and the fishermen. Both expected the death rate to be higher. No external sources of food were apparent such as fish carcasses or mollusc shells. No assumptions however can be made from these data regarding effects on the crabs other than outright mortality. It is doubtful that the observed limb loss was a natural occurence. Other responses to capture and starvation are beyond the scope of this study.

It was rare that an entire crab exoskeleton was found in the pots. Mortality was assumed because either the crab was missing or only the carapace was found in the pot. The dead crabs were probably washed out of the pots quickly due to extreme movement of water in Cook Inlet. Cannabalism by the living crabs likely aided in breaking up the exoskeleton so that the remains could easily flush out of the pot. The carapaces that were found in the pots were characteristically paper thin in texture. There is no obvious explanation for this phenomenon.

Limb loss in the living crabs became very evident over time. At the beginning of the experiment the crabs had all their appendages

intact. On the final day virtually all the crabs were missing limbs, in some cases three or four legs were gone. Quantitative documentation during the experiment was not made since counting limbs would have required additional exposure time for the crabs. Limited staff and sea conditions prohibited anything but counting the crabs and decking the gear during the final day.

There was no evidence of octopus predation since none were captured in the pots. Although there is some octopus bycatch from the pot cod fishery in this area, it is not substantial. Department pot and trawl surveys in these waters rarely catch octopi.

Finally, data from this experiment will be further analyzed in conjunction with a subsequent study on crab starvation and its effects which is currently ongoing at the University of Alaska, Institue of Marine Science, Seward Marine Center. Results of this work will aid the Alaska Board of Fisheries in determining both the appropriate escape device for shellfish and groundfish pots as well as relevant termination times for fisheries for each species.

LITERATURE CITED

Carls, M.G. and C.E. O'Clair. 1989. Influence of cold air exposures on ovigerous red king crab (Paralithodes camschaticus) and Tanner crabs (Chionecetes bairdi) and their offspring. Proc. Int. Symp. King and Tanner crabs. pp. 329-343.

Table 1. Number of adult male Tanner crabs surviving capture, without feeding, by retrieval date, 1992 male Tanner crab survival experiment.

	Pot Number				
Date	128	CC	171	55	Total
12/31/91[a]	33	33	33	33	132
01/07/92	33	33	33	33	132
01/14/92	33	32	33	32	130
01/28/92	33	32	32	32	129
02/25/92	25	27	30	27	109
03/10/92	24	26	28	27	105
03/17/92	24	25	28	27	104
04/10/92	20	21	23	23	87
04/28/92[b]	19	16	22	23	80

[a] Date of initial capture and beginning of experiment.

[b] Experiment terminated.

Table 2. Temperature, wind and mean exposure time by retrieval date, 1992 male Tanner crab survival experiment.

Date	Air temp. (°C)	Water temp. (°C)	Wind speed (knots)	Avg. Exposure Time
12/31/91	0	N/A	15-20	[c]
01/07/92	2	N/A	0	4 min. 22 sec.
01/14/92	4	5[a]	10	4 min. 30 sec.
01/28/92	-4	4[b]	20	4 min. 31 sec.
02/25/92	1	N/A	25	3 min. 17 sec.
03/10/92	0	3[b]	15-20	5 min. 47 sec.
03/17/92	1	N/A	10-15	3 min. 41 sec.
04/10/92	2	N/A	10-15	2 min. 25 sec.
04/28/92	N/A	N/A	20-25	[d]

[a] Surface.

[b] Taken at 10 feet below surface.

[c] Date of capture and beginning of experiment.

[d] Termination of experiment.

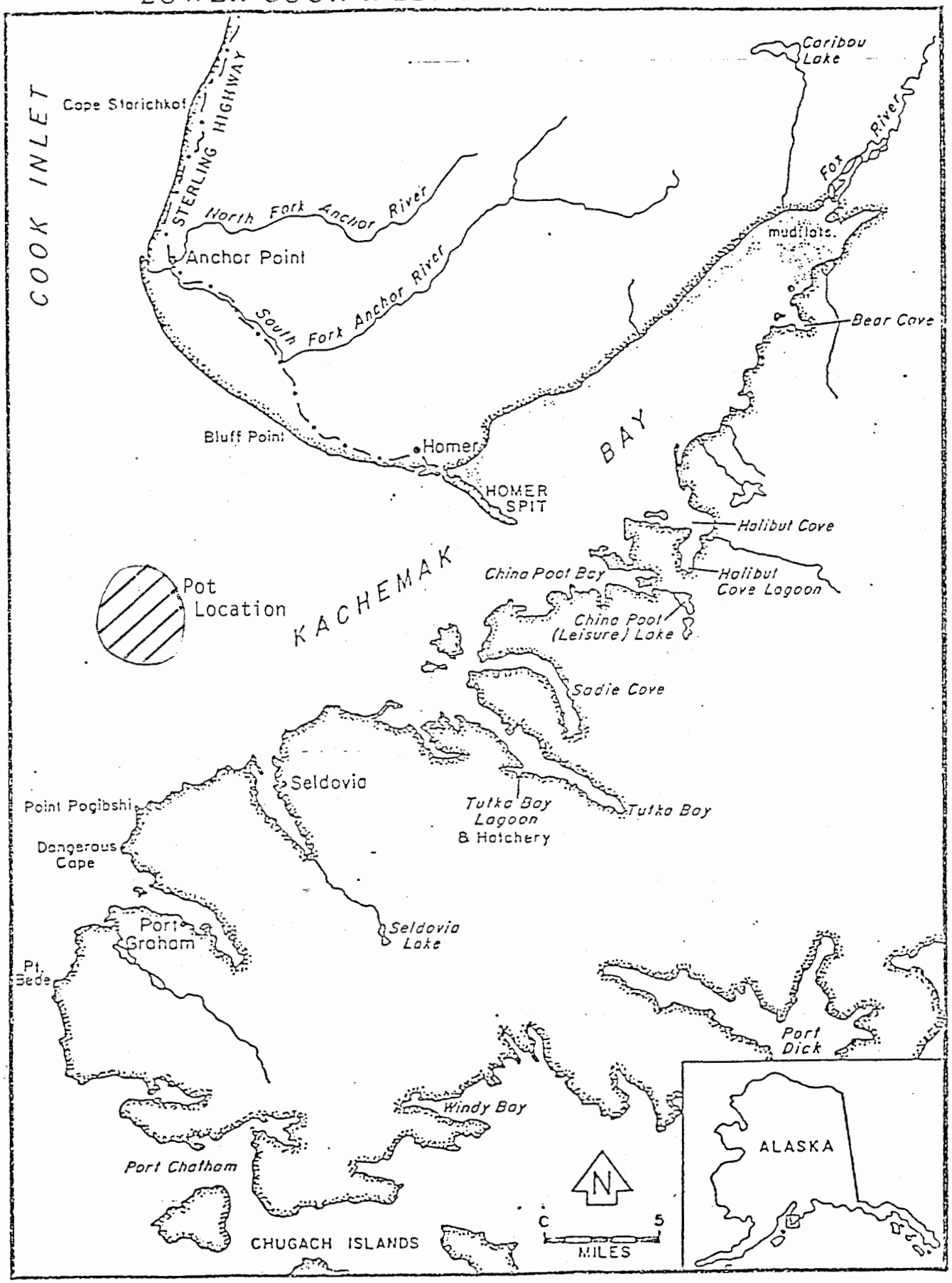

Figure 1. Pot location for Tanner crab survival experiment, Cook Inlet, Alaska.